FINAL RESULTS IN TUBERCULAR OSTITIS OF THE KNEE IN CHILDREN—COMMONLY KNOWN AS "WHITE SWELLING."

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Early in the spring of 1890 I began this investigation, and from that time to the present the bulk of the work has been done by Dr. P. H. Fitzhugh, house surgeon to the Hospital for the Ruptured and Crippled. We succeeded in getting the names of 499 patients who have applied for treatment at the Hospital for the Ruptured and Crippled since 1868, or who have applied at my clinic in the New York Polyclinic since 1882, or at my office since 1884. None have been included in this list who came under treatment since November 14, 1887. An exception might be made of the few who have applied for the correction of deformity or for the relief of an old sprain of the disabled knee. A few of this number are at present under observation, but are not receiving any active treatment. Perhaps many others might have been included in this list but for the lack of uniformity in nomenclature during the early days of my hospital life. For instance, the diagnosis of synovitis or peri-arthritis was made when the cases subsequently proved to be ostitis.

Starting, then, with this number, we aimed to make a personal examination of every case included in this analysis. In the Orthopædic Section of the last International Congress in Berlin, in 1890, I reported progress, but the report was handed to one of the secretaries, and I have up to the present time heard nothing of what disposition was made of my paper. The investigations have been continued with greater zeal, and up to January 4, 1892, we have secured final notes on 300 cases, which is the number on which the paper presented is based. My chief regret is my inability to tell how interesting and how instructive this investigation has proven, not only to Dr. Fitzhugh and myself, but to my associates in the hospital, for the past eighteen months. A large number of patients thus traced have borne willing testimony to the further relief to themselves by reason of this investigation.

Definition.—I find it necessary, before proceeding further with this analysis, to define just what is understood by tubercular ostitis of the knee. Long before Koch discovered the bacillus of tuberculosis it was known that the lesion of common tumor albus, or white swelling, was most active in the ends of the bones forming the knee-joint, and, in quest of a better nomenclature, we spoke quite confidently of an ostitis of the knee. Since the discovery of the bacillus, and since its absolute demonstration as a potent factor in the etiology as well as pathology of the affection under consideration, the term scrofulous or strumous, as applied to this disease, has been pretty well abandoned. Our definition, then, would be a tuberculous inflammation of the lower epiphysis of the femur, or the upper epiphysis of the tibia, or both, primarily, and a chronic inflammation by contiguity of the immediate joint structures.

CLINICAL FEATURES.—A child who is usually regarded as the frail member of the family begins to favor the knee by an almost imperceptible limp, or cries out with pain if the limb be moved in the usual way, and the parent immediately thinks of a fall or a sprain of some kind that has occurred while at play. A pretty careful home examination is made, and nothing definite is discovered. Next day or the day following the lameness is not so pronounced, or, at least, the parents think so, the wish being father to the thought, and the child goes about his play as usual. A few days, or sometimes a few weeks, subsequently it is found that the contour of the knee is altered a little, that the child is really more lame, and that more care is required in handling the limb. Then a physician is consulted, the joint functions are tested in a cursory manner, his eye detects the difference in appearance between the two joints superficially, and the case is regarded as either a sprain or a subacute rheumatic attack. If the former, the opinion is expressed that the child has sustained a fall or an injury of some kind. An investigation is instituted, and the opinion is confirmed. All children fall while at play at some time or other, and a severe fall is not necessary to the production of an injury of this kind. The mother or the nurse in this way becomes, by negligence, the cause of the child's disability. On the other hand, if the diagnosis of subacute rheumatism is made, then the father or mother remembers some twinges about the shoulders or some other part of the body that they have experienced, and the professional opinion is here confirmed. Whether the affection be diagnosticated as a sprain or as rheumatism, it is suggested that a few days, or a week or two at least, will decide the matter, and thus the disease makes headway. The lameness persists, the joint is vulnerable, and trauma now begins to play an important part. If the joint functions are fully tested at this time, there will be found reflex spasm on complete extension of the limb, and reflex spasm as the limit of complete flexion is approached. The only satisfactory way of testing the functions of the joint is to test the functions of the correspondingly sound joint, and both limbs should be bare of clothing. One who makes his test in this way will discover also a change in contour. The normal depressions on either side of the patella will be shallower than those on the well side; the ligamentum patellæ itself will show some expansion; the condyles and the head of the tibia, if pressed upon, will be found tender; there may be a little synovial distention, as shown by palpation and flexion of the limb; there will be found in the majority of instances atrophy of the thigh and of the calf, with increase of the knee measurements; furthermore, by palpation, one or two points of extra heat will be detected. It is in this early stage, though, that these signs are apt to be overlooked, not because the physician is incompetent to detect, or even incompetent to interpret, but they are overlooked because he fails to make an examination.

The symptoms and signs already enumerated belong to what is known as the first stage, that is, the stage preceding deformity. The presence of a distended synovial sac does not always take the disease beyond the first stage, because the inflammatory process in the end of the bone may extend by continuity and contiguity to the synovial sac, under the influence of a trauma, and this temporary synovitis may be but the expression of an exacerbation. I have many photographs of the knee in the first stage, but it is difficult to bring out the points in a large drawing, and hence I have made no effort to present them, but have endeavored to make my description sufficiently graphic to convey my meaning with precision.

Under the influence of impaired nutrition, under the influence of occasional severe traumatisms, and under the influence of the trauma of use, which is almost continuous when the child is walking or playing, the disease advances gradually into what is known as the second stage, or the stage of deformity. In a few instances this stage is never reached, because the original blow has been a light one and the focus of disease has not spread, but has been surrounded by a certain amount of bone sclerosis, thus protecting the patient against further disability. It is not always necessary to have multiple foci in the neighborhood of the joint, any more than it is to have multiple foci in the lung. The dosage of disease is a personal factor that ought not to be overlooked. Among pathologists the dosage of bacilli is always an important factor, not only in the selection of therapeutic measures, but in prognosis. On more than one occasion I have asked the distinguished President of this Academy about a given patient, whom he had sent from home in search of health, and got this reply: "Oh, he is doing very well; he was not struck very hard." The expression is certainly a good one, and I find myself calling it up many times in giving a prognosis about a given case of tubercular ostitis of the knee. This second stage of deformity is attended usually with varying degrees of pain. The muscular spasm is greater; night cries are more frequent; the lameness amounts frequently to absolute inability to walk. It is in this stage that abscess appears. The structures in immediate contact with the knee or adjoining bones are distended, and the suffering becomes at times intense. This in turn impairs still more the general health. Fomentations and blisters and plasters fail to give relief. The normal contour of the joint is changed into one wherein the skin is glossy, veins enlarged, superficial parts very tender, surface heat increased, and wherein the joint is fixed, any passive motion causing great pain. In this stage, too, we have exacerbations induced by trauma, or impaired health, or both. These exacerbations last from three or four days to three or four weeks. In the intervals the patient walks about, but with the heel raised, toes and ball of foot only touching the floor, the knee-limp still more exaggerated, and assisted by a crutch or cane.

The third stage is generally known as the suppurative stage, and is attended with luxation or subluxation of the tibia and of the patella. The fixation of the limb from spasm of the muscles—which spasm has been caused by the effort on the part of Nature to protect the joint against trauma—is replaced by ankylosis. Destruction of bone takes place, the cicatrices form after sinuses or uclers, actual shortening of tissue takes place. Shortening of the limb is now manifest, and the persistence of suppuration oftentimes induces a septicæmia that baffles medical skill, or an amyloid degeneration of liver and kidneys, or, in some instances, a tubercular meningitis, though patients more frequently develop meningitis in the second stage. It is difficult to fix the limit to these different stages of the disease. Suffice it to say that the average duration of tubercular ostitis is from three and a half to four years. More time might with propriety be devoted to clinical features, but the surgical literature is sufficiently full. I did wish, however, on the present occasion to refresh your minds with the more salient points, in order that you might more fully appreciate the results which have been obtained by art as well as by Nature.

THE ANALYSIS IN DETAIL.

I. *Sex, Side, Age when Disease developed, and Involvement of Other Joints.*

A. *Sex.* For this heading the full number of *cases to be traced* can be employed, and we find 223 females and 276 males.

B. *Side.* There were 239 cases wherein the affected knee was the right, 235 wherein it was the left, and 25 wherein the side was not given.

C. *Age when disease developed.* Forty-seven patients developed the disease before the close of the second year of life; 64 between the second and third; 40 between the third and fourth; 46 between the fourth and fifth; 47 between the fifth and sixth; 33 between the sixth and seventh; 20 between the seventh and eighth; 27 between the eighth and ninth; 15 between the ninth and tenth; 12 between the tenth and twelfth; 20 between the twelfth and fifteenth; 7 between the fifteenth and twentieth; 5 between the twentieth and twenty-fifth; 3 between the twenty-fifth and thirtieth; 1 at the age of forty-one; and in 112 cases the age was not ascertained.

Unfortunately these 112 cases must be left out of the count, and we have then 387 cases for this part of the analysis, namely, the age when disease developed. In 197 or nearly 51 per cent. the disease developed before they were five years of age; 142 or 36 per cent. between the ages of five and ten. We then have 339 patients or over 87 per cent. of the whole number, in whom the disease showed itself prior to the tenth year of life. In 39 cases or about 10 per cent. ostitis developed between their tenth and twentieth year, while still in the period of youth, and 9 or about 2 per cent. after they had passed the twentieth year of life.

D. *Involvement of other joints.* Much has been written about the involvement of other joints, and the fear is often expressed that the disease may break out elsewhere. Of 499 cases there were only 16, or 3 per cent., wherein other joints or bones were involved, so that the danger is not great. Of the 16, 8 had Pott's disease of the spine; 2, ostitis of the hip, or hip disease; 1, ostitis of the ankle, commonly known as caries of the ankle; 1, disease of the elbow; 1 case had a like disease of the wrist and shoulder; 2 had the affection in the other knee; and 1 extraordinary case had the following joints involved: the other knee, the elbow, and the shoulder.

Of 300 cases, 140 (46 per cent.) had abscess, 160 never had abscess, 40 have died; cause of death as follows: 6 of tubercular meningitis, 14 from exhaustion after prolonged suppuration, 3 from phthisis, 2 from dysentery, 2 from amyloid degeneration, 12 from intercurrent affections not connected with the disease, and 1 from shock following excision. It is fair to assume that 22 died *as a result of the disease*, causing exhaustion from suppuration, tubercular meningitis, and amyloid degeneration. This gives us a mortality of 7⅓ per cent.

II. *Analysis with reference to Treatment.*

All the cases have been subjected to one of three kinds of treatment, which may be designated as follows:

1. The purely *expectant*, which means the treatment of symptoms with little reference to signs, little reference to correction or prevention of deformity; an effort to relieve exacerbations, and, during intervals, freedom from treatment; the irregular use of apparatus; frequent changes in apparatus, no special form being used sufficiently long to even test the efficiency of the same.

2. The *fixation* treatment. This means the continuous use of some form of apparatus, whether plastic or steel, some of which partially and some completely immobilize. Under this class may be named the posterior Knight brace, the plaster-of-Paris bandage, either solid or cut

down and trimmed up as a splint; and the various forms of extension apparatus in use.

3. The third is the *protective* treatment, which means immobilization of the joint until all acute signs have subsided and convalescence can be safely predicated; the use of an apparatus that prevents concussion or jar—in fact, trauma of any kind—whether in the shape of a perineal crutch or axillary crutches. I do not class under protection splints the ordinary extension apparatus, because the adhesive plasters with which traction is secured slip, and the skin and deeper tissues themselves move, so that jar or trauma is not prevented. Under the term protective may also be included *corrective*, which means the correction of deformity, either by apparatus, by manual force under an anæsthetic, or by incision. It so happens that we depend largely, in the protective treatment, on the Thomas knee splint. This, as you see, is simply a peroneal crutch with high shoe, or patten, for the sound foot. For this reason we have spoken of this as the Thomas method—after the late H. O. Thomas, of Liverpool. It is only fair to Mr. Thomas, and to those who advocate the protective treatment I have defined, to say that Mr. Thomas did not employ fixation apparatus in the sense employed by American surgeons. He was opposed to the use of plaster-of-Paris or any form of plastic dressing that prevented frequent inspection of the knee. It is true that his splint consisted of a posterior leather trough, on which the limb rested, and to which the knee was secured by means of a roller bandage. From what I saw of his treatment I am sure, however, that he aimed to protect the joint against trauma, and that he aimed to immobilize by means of his posterior trough in the splint and the roller bandage. So that the method, after all, can and should be known as the Thomas treatment.

It has been exceedingly difficult to draw a sharp line of distinction between the three methods already defined. Still, in a general way, we have sufficient data for the following figures: 71 cases are recorded as having been under the expectant treatment, with 3 deaths, 2 of which only were from the disease; 5 came to excision, 3 to amputation, and 60 remained with fair results. In 190 cases the fixation treatment was adopted throughout. Of this number there were 35 deaths, 20 of which were traceable to the disease itself (about 10 per cent.); 9 came to excision, 1 to amputation, and 145 remained with more or less fair results. Only 39 have been subjected to the protective, or Thomas, treatment. Two died from causes in no way connected with the disease itself; 37 remained with good results.

The results in the 60 cases under the expectant plan show that 23 had abscess (38 per cent.), 37 had no abscess. Of the 145 under the fixation plan, there were 63 with abscesses (43 per cent.), 82 without. Of the 37 under the protective plan, 19 (about 50 per cent.) had abscesses, 18 not. This shows a greater proportion of abscess cases among those treated by the protective plan, but it can be easily shown that the majority had abscess before the Thomas treatment was begun.

Analysis as regards motion. Among 23 suppurative cases—cases treated by the expectant plan—14 had motion, 9 were pretty firmly ankylosed. Among those without abscess (37 cases) 30 had motion and 7 were ankylosed.

Under the fixation plan (63 cases), where abscess had occurred, there was motion in 43 instances and ankylosis in 20. Among those without abscess (82 cases), 70 had motion, 12 had no motion.

By the protective plan, where abscess occurred (19 cases), 16 had motion and 3 were ankylosed. Where abscess did not occur (18 cases), all had motion, none were ankylosed.

A *résumé* now would be as follows: Of 60 cases under the expectant plan, 44 (or 60 per cent.) had motion, 16 had no motion. Under the fixation plan, in 145 cases, 113 (76 per cent.) had motion, 32 had no motion. Among those treated by the protective plan, in 37 cases, 34 (95 per cent.) had motion, 3 had no motion.

Briefly, then, this analysis shows that motion was obtained more frequently in those treated by the protection plan. The table will show the percentages, and no further reference will be made to that on this occasion.

Other tables show the amount of motion, and I will only say here that 16 of the cases where abscess occurred presented over 90° of motion, while in those where abscess did not occur 25 could be voluntarily moved over an arc of 90°.

Another table will show the intervals of time elapsing between the last observation and the beginning of the disease. There were, for instance, 6 cases where from twenty to thirty years had elapsed; 7 from fifteen to twenty; 22 from ten to fifteen, and so on.

Relapses. It is interesting to note that relapses are not very frequent. Reference to the tables shows that among the abscess cases only 4 relapses occurred in periods varying from seven to twenty years afterward. Among the non-abscess cases 6 relapsed. The question is often raised, Do not these patients require apparatus of some kind the remainder of their lives? This point has been investigated, and of the abscess cases only 14 (4½ per cent.) are wearing some sort of support; of those where abscess had not occurred, 22 (7 per cent.), making a total of 36 (12 per cent.) out of the 300.

Deformity. Of all the cases, both abscess and non-abscess, whether ankylosed or with motion, 150 presented subluxation of the tibia, against 48 where there was no subluxation. Only 2 of the whole number presented complete luxation. In 183 cases where the condition of the patella was observed, in 124 cases the patella was movable, in 59 there was no motion.

The position of the limb; or, rather, the limit of extension. Reference to my tables here shows that of 227 cases, only 15 got well with deformity at an angle under 135°, and 141 presented an angle of deformity of not less than 165°. This enabled them to walk with their limbs practically straight, and with scarcely an appreciable deformity. To go more into details, 71 could extend their limbs to an angle between 175° and 180°.

By comparing the different methods of treatment, it can be shown, without going into details, that the protective treatment gives the largest percentage of good results, so far as position is concerned, the fixation next, the expectant the smallest percentage.

The length of the condyles. Forty-eight cases have been analyzed with reference to epiphyseal lengthening. To this 48 I am at liberty to add 68 analyzed by Dr. John James Berry, at that time a member of my house staff, who published in the Boston *Medical and Surgical Journal*, many years ago, a paper on "The Growth of Bone in Knee-joint Disease, from Measurements of Ninety-two Cases." Taking, then, for our analysis 116 cases, we find the following:

In 6 cases	1 inch lengthening.
In 15 "	¾ " "
In 34 "	½ " "
In 17 "	¼ " "

Great care was taken, both by Dr. Berry and myself, in securing these measurements. The extreme end of the condyle was found on both sides, a mark made on the skin directly over the end of the condyle, and the two sides carefully compared. This gives us 62 per cent. of the whole number with increased length. A larger percentage of cases occurred among those treated by the protective method.

Among the cases that came to excision (14 in number), an analysis bearing on the deformity and shortening is as follows:

1 was held fixed at an angle of	120°.
1 " " "	150°.
1 " " "	160°.
6 were " " "	170°.
3 only " " "	180°.[1]

2 deformity not known.

In 3 of these the deformity was less than 160°. As to shortening:

1 presented only	½ inch shortening.
1 " "	1½ " "
2 " "	2 " "
1 " "	2½ " "
1 " "	3 " "
1 " "	3½ " "
2 " "	4 " "
1 " "	8 " "

4 not known.

Five of these present still a high degree of sensitiveness over the patella.

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[1] That is, perfectly straight.

TABLE I.—NON-ABSCESS CASES WITHOUT MOTION.

Number of years after inception at last observation.	Ankylosed.							Relapse.	Remaining under treatment.			
	105° to 115°	115° to 125°	125° to 135°	135° to 145°	145° to 160°	160° to 170°	170° to 180°		Support only.	Fixation.	P. P. and Thomas	
From 3 to 5 years	...	...	...	...	...	...	...	...	...	...	...	
" 5 " 7 "	...	...	...	...	...	...	..	...	...	...	...	
" 7 " 10 "	...	...	...	2	1	1	1	1	1	1	...	
" 10 " 15 "	...	1	1	2	1	2	...	...	1	...	...	
" 15 " 20 "	1	..	...	1	...	...	...	...	...	...	..	
" 20 " 30 "	...	...	1	...	1	3	...	...	...	...	...	
Total . . .	1	1	2	5	3	6	1	1	2	1	...	
Treatment.								Total.	Subluxated.	Luxated.	Patella movable	Patella fixed.
Expectant	1	...	2	2	...	2	...	7	7	...	...	7
Fixation	...	1	...	3	3	4	1	12	10	...	...	12
P. P. and Thomas .	...	...	...	...	...	...	...	...	...	...	...	...

TABLE II.—NON-ABSCESS CASES WITH MOTION.

Number of years after inception at last observation.	Degree of extension.							Relapse.	Remaining under treatment.			
	115° to 125°	125° to 135°	135° to 145°	145° to 155°	155° to 165°	165° to 175°	175° to 180°		Support only.	Fixation.	P. P. and Thomas.	
From 3 to 5 years	...	...	...	1	...	6	15	...	...	2	4	
" 5 " 7 "	...	...	...	...	3	5	6	...	...	2	1	
" 7 " 10 "	...	...	3	6	5	5	8	1	1	4	1	
" 10 " 15 "	...	1	...	2	8	8	9	1	1	2	...	
" 15 " 20 "	...	2	2	2	1	5	7	2	1	4	...	
" 20 " 30 "	1	1	1	...	...	3	1	1	1	2	...	
Total . . .	1	4	6	10	17	32	46	5	4	16	6	
Same have following amount of motion.								Total.	Subluxated.	Luxated.	Patella movable	Patella fixed.
5° motion	...	1	1	2	...	3	3	10	4	1	3	6
5° to 10 "	...	3	1	...	3	6	3	16	11	1	11	3
10 " 15 "	...	...	1	2	1	4	3	11	8	...	6	1
15 " 25 "	...	...	1	4	1	5	2	13	12	...	12	...
25 " 35 "	...	...	...	2	3	5	4	14	11	...	9	2
35 " 45 "	...	...	1	...	...	2	2	5	1	...	3	...
45 " 60 "	...	...	...	...	1	3	1	5	5	...	5	...
60 " 75 "	1	...	1	1	4	2	1	10	9	...	9	...
75 " 90 "	...	...	...	...	3	3	3	9	4	...	8	...
Beyond 90 "	...	...	...	...	...	...	25	25	4	...	19	1
Treatment.												
Expectant	1	1	1	3	12	8	4	30				
Fixation	...	3	6	6	7	19	28	69				
P. P. and Thomas .	...	...	...	...	...	5	13	18				

TABLE III.—ABSCESS CASES WITHOUT MOTION.

Number of years after inception at last observation.	Ankylosed at							Open sinuses.		Relapse.	Remain under treatm't.		
	105° to 115°	115° to 125°	125° to 135°	135° to 145°	145° to 160°	160° to 170°	170° to 180°	1 to 3	3 to 5		Support only.	Fixation.	P. P. and Thomas
From 3 to 5 years	...	...	...	1	1	2	...	1	...	...	...	1	...
" 5 " 7 "	...	...	1	...	1	2	...	...	...	...	...	...	...
" 7 " 10 "	1	1	2	2	2	1	1	1	...	...	...	1	...
" 10 " 15 "	1	...	1	2	...	2	...	...	1	1	...	...	...
" 15 " 20 "	...	...	1	1	1	1	...	...	...	...	...	...	...
" 20 " 30 "	...	1	...	2	1	...	...	...	...	...	1	...	...
Total . . .	2	2	5	8	6	8	1	2	1	1	1	2	0
Cicatrices.								Total.		Subluxated.	Luxated.	Patella movable	Patella fixed.
1 cicatrice	...	...	...	1	1	2	...	4	...	4	...	...	4
1 to 3 cicatrices	1	...	...	3	3	5	1	13	...	10	1	1	12
3 " 5 "	...	...	...	1	2	2	...	5	...	5	...	...	4
5 " 7 "	...	1	2	1	...	...	...	4	...	4	...	...	3
7 " 10 "	...	1	...	1	1	...	...	3	...	3	...	...	3
10 " 15 "	1	...	...	...	...	...	...	1	...	1	...	...	1
15 " 20 "	...	...	1	...	...	...	...	1	...				
Treatment.													
Expectant . . .	1	1	...	2	4	1	...	9					
Fixation . . .	1	1	4	6	3	4	1	20					
P. P. and Thomas	...	...	...	...	...	...	...	3					

TABLE IV.—ABSCESS CASES WITH MOTION.

Number of years after inception at last observation.	Degree of extension.							Open sinuses.		Relapse.	Remain under treatm't.		
	115° to 125°	125° to 135°	135° to 145°	145° to 155°	155° to 165°	165° to 175°	175° to 180°	1 to 3	3 to 5		Support only.	Fixation.	Thomas.
From 3 to 5 years	...	...	...	1	2	3	4	1	...	...	...	2	1
" 5 " 7 "	...	...	...	...	2	2	4	...	...	...	...	1	1
" 7 " 10 "	...	...	1	1	5	6	8	2	...	1	...	2	3
" 10 " 15 "	1	1	1	2	2	9	6	1	1	1	...	3	...
" 15 " 20 "	...	1	1	1	2	2	...	...	...	1	...	3	...
" 20 " 30 "	...	...	...	2	1	2	1	...	...	...	2	1	...
Total . . .	1	2	3	7	14	24	23	4	1	3	2	12	5
Amount of motion.								Total.		Subluxated.	Luxated.	Patella movable	Patella fixed.
5° motion	...	...	1	3	2	2	1	9	...	7	...	4	4
5° to 10 "	...	...	1	1	1	5	2	10	...	8	...	6	2
10 " 15 "	...	...	1	2	3	3	1	10	...	8	...	5	1
15 " 25 "	1	1	...	...	3	1	1	7	...	5	...	2	5
25 " 35 "	...	...	...	1	4	2	1	8	...	7	...	5	1
35 " 45 "	...	...	...	...	1	2	2	5	...	3	...	5	1
45 " 60 "	...	1	...	...	1	1	...	3	...	3	...	4	
60 " 75 "	...	...	...	...	...	3	2	5	...	3	...	5	
75 " 90 "	...	...	...	...	...	...	1	1	...	...	...	1	
Over 90 "	...	...	...	...	...	2	14	16	...	3	...	13	
Cicatrices.													
1 cicatrix	1	...	1	2	7	3	10	24					
1 to 3 cicatrices	...	1	2	2	4	7	8	24					
3 " 5 "	...	1	...	...	5	5	5	16					
5 " 7 "	...	...	...	2	...	2	1	5					
7 " 10 "	...	...	...	1	2	...	...	3					
10 " 15 "	...	...	...	...	...	1	...	1					
Treatment.													
Expectant . . .	1	...	1	2	3	5	2	14					
Fixation . . .	...	2	3	5	11	10	13	44					
P. P. and Thomas	...	...	...	...	3	4	9	16					

TABLE V.—THIRTY-NINE CASES ANALYZED AS TO MODE AND DURATION OF TREATMENT AND RESULT.

Compared as to Mode and Duration of Treatment.

Length of time treated.	Thomas and fixation.	Fixation.
Less than 3 years	8	8
" " 4 "	2	7
" " 5 "	...	3
" " 7 "	...	5
" " 9 "	...	3
" " 11 "	...	3
Total	10	29

Compared as to Mode of Treatment and Result.

Degree of motion.	Thomas and fixation.	Fixation.
Less than 10°	...	1
Having 10	1	3
" 20	...	2
" 40	...	5
" 60	...	2
" 80	...	3
Over 80	9	13
Total	10	29

It has long since been established that the growth of bone is seriously interfered with by excision, and surgeons, as a rule, avoid operating on the knee-joint. The cases that I have presented lend additional weight to the argument against the operation. The appearance of sinuses, the infiltration and distortion of the limb, seem to demoralize the surgeon at times, and he feels that only an excision will save life.

The tables given are presented without comment further than sufficient to make them clear. It was my intention to supplement the paper by illustrations, but this would make it unusually long.

Table I. refers to the cases wherein no abscess occurred, and where ankylosis has resulted; II., the same class of cases with motion. Table III. relates to abscess cases without motion; IV., abscess cases with motion. Table V. is a comparative table, and may be of interest in fixing more definitely the facts obtained from the analysis above given.